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Electrogenerated bromine as a coulometric reagent for the estimation of the bioavailability of polyphenols

Nizamova A., Ziyatdinova G., Budnikov G.
Kazan Federal University, 420008, Kremlevskaya 18, Kazan, Russia

Abstract

A method is proposed for the estimation of the bioavailability of polyphenols using electrogenerated bromine as a coulometric titrant. The titration of model solutions of casein and bovine serum albumin (BSA) shows that casein does not interact with electrogenerated bromine, while BSA reacts with the titrant in the ratio 1 : 63. The proteins bind rutin and quercetin (from 14 to 90%) at a high rate and thus reduce the bioavailability of polyphenols. The concentration of free polyphenol is reduced with an increase in the con- centration of protein in the mixture. The total antioxidant capacity (AOC) of tea is determined. Green tea is shown to possess higher AOC than the black one because of the partial oxidation of polyphenols to respective thearubigins and theaflavins at the fermentation step in the production of green tea. The total AOC of tea drops from 7 to 85%, in proportion to the increase in the amount of milk in the mixture. Milk proteins bind tea polyphenols into complexes because of intermolecular interactions and thus reduce their bioavailability. The observed effect of milk is independent of the brand of black tea. The degree of reduction of the total AOC of tea in going from one tea to another remains virtually constant. © Pleiades Publishing, Ltd., 2011.

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Keywords

Bioavailability, Bromine, Polyphenols